



Report on Office of Naval Research Account 150-6702A

"Core Scientific Effort for Biosurface Studies (TASK D)"

Final Report for Period Ending 30June92

N00014-88-K-0523

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ELECTE
SEP 29 1992

Principal Investigators:

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and

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**Final Budget Report
ONR 150-6702A**

Increment - \$11,000

Personnel - <i>Gary Jones</i>	\$6,675.
Fringe Benefits (27%)	802.
Supplies - <i>Reference Materials</i>	2,172.
Total Direct Costs	9,649.
Indirect Costs (14%)	1,351.
Total Costs	\$11,000.

Statement A per telecon Bernard Zaheranec
ONR/Code 1123
Arlington, VA 22217-5000

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Report on ONR Project, Account Number 150-6702A

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A. Current Program Status

I. Overview

This report summarizes the performance during the contract extension period ending 30June92 for the I/U Center for Biosurfaces (IUCB). In the past year of ONR-funded activities of the IUCB, all original components of the program were continued: administration, the "Core" research program, and "Associated" research projects. Associated projects were funded after Members Advisory Board (MAB) review and approval using Member and University funds.

National Science Foundation, New York State and University funding, along with that from current industrial members, developed and sustained the base of fundamental research. The IUCB recommended funding for a new group of projects as a result of the MAB proposal evaluation meeting held January 28 and 29, 1992. Eleven associated projects are now supported for a one-year period with Member, University, and NSF funds. Details of the MAB meeting (Appendix D) and the research recommended for funding (Appendix A) are included in this report.

II. Membership Status

The IUCB completed annual research agreements with Becton-Dickinson Corporation, Bausch and Lomb and Procter and Gamble, as Center Members. Membership funding from the Office of Naval Research (ONR) in support of the Core Program continued as a no-cost extension of the original contract. A renewal proposal has been submitted separately for another three years, through the ONR program called "Molecular Interactions at Marine Interfaces". American Cyanamid and GIBCO Life Technologies have proposed "in-kind" projects to maintain membership through 1993. Negotiations are in progress with the Army's Chemical Research, Development and Engineering Center.

III. Operating Budgets

The IUCB was originally set up to operate with a balance of three sources of income for the program. The first was NSF CDR #88-17192, providing funding for administration of the program at SUNY Buffalo and for cooperative research at Montana State University, a partner of this program. In addition to space, overhead waiver, and equipment/facilities assignments, the University awarded funding to the Center in the amount of \$141,000 as part of the University's "Organized Research Unit" program.

Members provided the most important component of funding for the IUCB program. In 1991/92, membership fees increased to \$240,000 (6 members); add-on projects accounted for an additional \$60,000. The projected total budget for the IUCB for August 15, 1991 to August 15, 1992 is \$584,535, as noted in the following table. As a means of cost cutting for the program's administrative components, and as a necessary response to continuing cuts in New York State support, management responsibility (and personnel) for major

instruments utilized by the Center has been transitioned to the Department of Biomaterials (G.H. Nancollas, Chairman). This lessens the administrative burden on Center Staff, while access to the equipment for projects of the IUCB is maintained because both Co-Directors have faculty appointments in the Department of Biomaterials.

IUCB Operating Budget

Member Companies (6 @ \$40,000)	240,000
NSF and Supplements	99,239
University Commitment	141,000
Add-On Projects	60,000
Service and Facility	44,296
TOTAL:	584,535

B. Current Research Status

I. Summary of the Research Program

As a result of the MAB proposal review meeting in January 1992, six main projects were recommended for industrial funding for a 12-month period. Two other projects were funded at a "starter" level. Two projects at Montana State University are continued with NSF funding. An NSF RUI-funded project also continues. An overview of the collective program is given in the Figure 1 Gantt Chart. Current research projects at SUNY Buffalo are these:

Dr. Frank Bright (Department of Chemistry) - Dynamic Protein Adsorption at Reference Material Interfaces, with Supplemental Provision of Characterized Optically-Transparent Substrata to Core Program (revised and continued from 1991);

Dr. Joseph Gardella, Jr., (Department of Chemistry and Department of Biomaterials) - Ultrahigh Vacuum Surface Analysis of Model Organic and Biological Films on Solid Substrata with Special Emphasis on Reference Material Packaging and Surface Cleanliness Documentation (revised and continued from 1991);

Dr. George Nancollas (Department of Biomaterials and Department of Chemistry) - Dynamic Mineralization Studies at Reference Material Interfaces, with Supplemental Provision of Characterized Calcium Hydroxyapatite Substrata to Core Program (revised and continued from 1991);

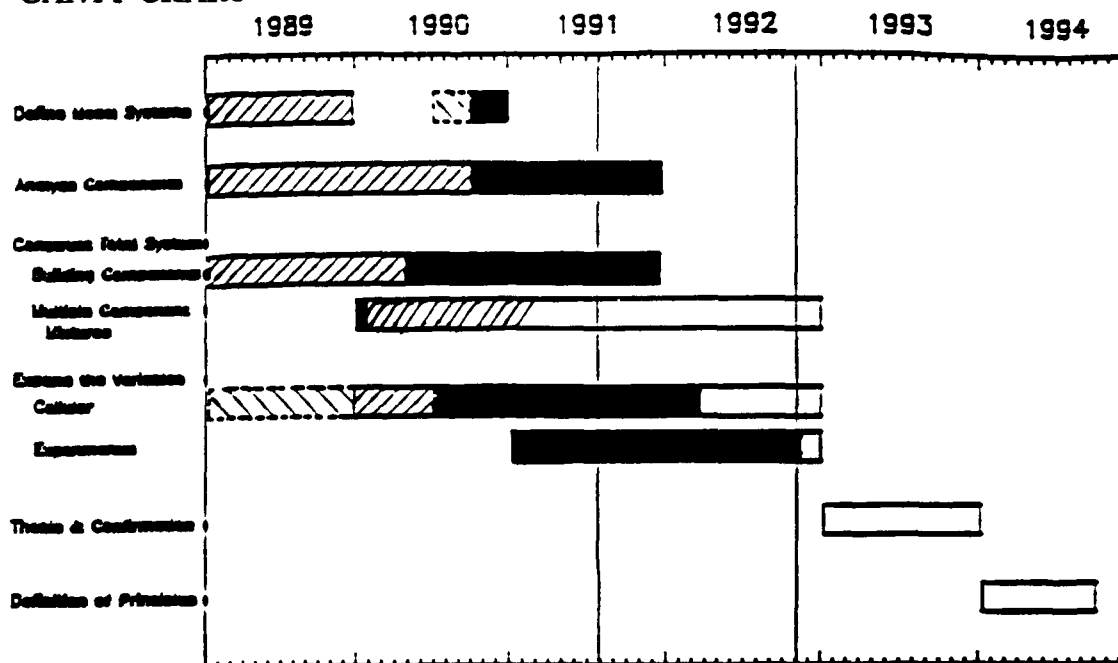
Dr. Robert E. Baier and Dr. Anne E. Meyer (IUCB) - Reference Material Sterilization and Pre-Exposure Analyses, with Supplemental Dynamic Testing;

Dr. John H. Campbell (Orofacial Medicine) - Direct Contact Assays of Mesenchymal and Epithelial Cell Responses to Reference Substrata in vitro, with Extension to Leukocyte/Macrophage Interactions (revised);

Dr. David M. Anderson (Department of Biomaterials) - Exploration of Triply-Periodic Hydrogel Structures, with Supplemental Provision of Characterized Poly-Hydroxyethyl-methacrylate Specimens to Core Program (revised);

Dr. Scott L. Diamond (Chemical Engineering) - Immunofluorescence and Colloidal Gold Evaluation of "Conditioning" Films, with Provision of Specimens to Core Program for Post-Exposure Analyses (revised).

GANTT CHART



PROGRESS MADE ON IUCB'S RESEARCH PROGRAM

DURING PERIOD SEPTEMBER 1, 1991 - APRIL 30, 1992

- Heavy black lines indicate the current reporting period
- Black boxes show the extent of progress made during this period
- Right-hand crosshatch shows the extent of progress made on original plan
- Left-hand crosshatch shows the extent of progress made, but not part of original plan
- White boxes indicate yet to be accomplished; original plan

FIGURE 1

Current research abstracts are included in an Appendix.

Dr. Keith Cooksey's project, conducted at Montana State University over the past year, was given a no-cost extension by the MAB; this project is entitled "A Study of Adhesion of Fouling Diatoms to Surfaces of Defined Composition Including an Examination of the Source and Role of the Conditioning Film." NSF funds earmarked for Montana State University in 1990/91, awarded to Dr. Gordon McFeters (Department of Microbiology), were used to study the physiological status of bacteria in biofilms. The Members Advisory Board has suggested an action plan for better integration of the MSU investigators into the Center's program, currently under review.

II. Technical Personnel

In addition to funded faculty, the following individuals provided the 1991-92 technical foundation of the IUCB:

Robert E. Baier, Co-Director
JoAnn Earle, Research Support Specialist, Core Program (Transverse Analysis)
Joseph A. Gardella, Jr., Co-Director
Gary L. Jones, Senior Research Support Specialist, Core Program (Planar Analysis)
Anne E. Meyer, Principal Research Scientist
Terrence G. Vargo, Post-Doctoral Fellow (High-Vacuum Surface Spectroscopy)

Graduate research students involved in the 1992-93 IUCB program are listed in Appendix E, along with their faculty advisors.

The NSF-supported minority undergraduate research student in the past year was Belinda Martinez. Her resume is attached in Appendix B.

C. New and Continued Research Support

I. NSF Women, Minority, and Disabled Engineering Research Assistants

A budget of \$5000 has requested for the support of this student. This request is noted in Appendix H, Budget.

II. Continued Support of IUCB Program

In addition to support of the minority undergraduate research assistant, base support in the amount of \$75,000 was requested from NSF for continuation of the originally proposed joint program between the Buffalo and Montana groups. That total budget request of \$80,000 is noted in Appendix H.

Appendix A. Current Research Abstracts and Faculty Biographical Sketches

Reference Material Sterilization and Pre-Exposure Analyses, with Supplemental Dynamic Testing

Dr. A. E. Meyer and Dr. R. E. Baier
I/U Center for Biosurfaces and Department of Biomaterials

Includes selection and/or development of "conventional" sterilization protocols for current dry polymer and metallic Core Program reference substrata and the provision of "ambient environment" surface characterizations for these materials as-prepared, after-sterilization, and after removal from packaging (developed in separate project). Includes performance, as remaining budget allows, of limited dynamic exposure trials as described in 1992 proposal.

Note: Flow studies of Meyer from 1990-91, and Baier/Meyer thin-layer immunoassay studies from 1991-92, will be completed within the budgets originally allocated. Results will be reported in 1992.

Ultrahigh Vacuum Surface Analysis of Model Organic and Biological Films on Solid Substrata with Special Emphasis on Reference Material Packaging and Surface Cleanliness Documentation

Professor J. A. Gardella, Jr.
Departments of Chemistry and Biomaterials

Includes selection and/or development of packaging materials/protocols for current dry polymer and metallic Core Program reference substrata, performance of ultra-high vacuum (UHV) surface analyses, and the provision of standard "data sheets" documenting the surface characteristics of these materials by both UHV and "ambient environment" methods, as prepared, after sterilization, and after packaging + storage for at least 90 days. Includes performance, as remaining budget allows, of MAB-approved "cold probe" and TOF-SIMS studies.

Note: Since stainless steel and polylactide are included in the list of materials yet to be prepared, sterilized, packaged, and documented, an opportunity exists to complete characterizations important to continuing Navy interests.

**Dynamic Protein Adsorption at Reference Material Interfaces, with
Supplemental Provision of Characterized Optically-Transparent Substrata
to Core Program**

**Professor F. V. Bright
Department of Chemistry**

Includes performance of optical flow cell studies of protein adsorption/desorption kinetics at both transparent and opaque reference substrata, as well as the provision of approximately 200 well-characterized specimens of fused silica and "coated" fused silica to the IUCB Core Program.

Note: It is expected that a portion of this budget will be utilized to pay necessary costs of "ambient environment" and UHV surface analyses, as well as sterilization and packaging costs, for the reference substrata specimens that will be provided to the Core Program.

**Dynamic Mineralization Studies at Reference Material Interfaces, with
Supplemental Provision of Characterized Calcium Hydroxyapatite
Substrata to Core Program**

**Professor G. H. Nancollas
Departments of Chemistry and Biomaterials**

Includes flow-through mineralization studies, using Constant Composition and Dual Constant Composition apparatus as appropriate, at interfaces of reference substrata, as well as the provision of approximately 200 well-characterized specimens of smooth-surfaced calcium hydroxyapatite to the IUCB Core Program.

Note: It is expected that a portion of this budget will be used to pay separate costs of "ambient environment" and ultra-high vacuum surface analyses plus required sterilization and packaging costs for the reference substrata specimens to be provided to the Core Program.

Direct Contact Assays of Mesenchymal and Epithelial Cell Responses to Reference Substrata in vitro, with Extension to Leukocyte/Macrophage Interactions

Dr. J. H. Campbell
Department of Otolaryngology

Includes continued evaluations of cellular responses to reference metals, polymers, and ceramics provided by the Core Program, differentiating among malignant and non-malignant cell lines of both mineralizing and non-mineralizing types. Also includes exploratory investigations of immune-system mediated responses to Core Program reference materials, as expressed in chemotactic responses of white cells.

Note: This budget includes the remainder of the original funding recommended for the basic project by the MAB in 1991. It anticipates modest new start-up efforts in the proposed areas of immunologic responses of human lymphocytes and macrophages.

Exploration of Triply-Periodic Hydrogel Structures, with Supplemental Provision of Characterized Poly-Hydroxyethylmethacrylate Specimens to Core Program

Professor D. M. Anderson
Department of Biomaterials

Introductory studies of poly-HEMA as a potential polymerizing phase for triply-periodic lipid structures, together with the provision of approximately 200 well-characterized nonporous poly-HEMA reference specimens to the IUCB Core Program.

Note: This work will be done in close collaboration with Professor Gardella.

Immunofluorescence and Colloidal Gold Evaluation of "Conditioning" Films, with Provision of Specimens to Core Program for Post-Exposure Analyses.

Dr. S. L. Diamond
Department of Chemical Engineering

Employment of FITC and Texas-Red probes and silver-enhanced immuno-conjugated gold particles for measurement of surface-exposed "conditioning" film epitopes formed on Core Program substrata, followed by provision of representative fixed specimens to the IUCB Core Program for inspection by UHV and histologic cross-section techniques.

Note: This work will be coordinated with fluorescence studies of Dr. Bright, as a further investment in highly-specific identification techniques for surface-adsorbed macromolecules.

Provision of Core Program Reference Materials/Services

Ms. S. Arnold, Center Administrator
I/U Center for Biosurfaces

Raw material costs, sterilization services, packaging materials, printing and documentation labor, and costs for "ambient environment" and UHV post-exposure analyses of Core Program reference substrata returned from Cell Biology and Bacterial/Diatom Adhesion projects ongoing since 1991.

Note: This allocation includes 25% salary commitments for IUCB Research Associates Gary Jones and JoAnn Earle. There is an additional balance of approximately \$7,500.00 in built-up instrument time credit with the Biomaterials Instrumentation Center.

**Performance and Documentation/Reporting of Post-Exposure
Characterizations of Core Program Specimens Returned from Cell
and Microorganism Bioadhesion Investigators.**

**Dr. R. Baier, Professor J. Gardella, Jr., Dr. T. Vargo
I/U Center for Biosurfaces**

Core Program Reference Specimens exposed for varying times to the relevant biological systems used for mammalian cellular adhesion assays, bacterial interaction assays, and diatom attachment/motility assays, will receive post-exposure analyses to identify and characterize acquired "conditioning" films and compare them with "Core Program" reference data on the pre-exposed surface qualities of the original substrata and of representative biofilm components previously analyzed (singly and in combination) by "ambient environment" and UHV techniques.

Note: This effort requires concurrent documentation of existing sample preparation and analysis protocols, and technical reporting of the pre-exposure characteristics of Core Program specimens in their as-prepared, sterile, and after-packaged states.

**Evaluation of the Effectiveness of Bacterial Retention by Core Program
Reference Substrata, and Observation of Substratum-Related Influences on
Expression of Bacterial Surface "Adhesins".**

**Professor J. Merrick
Department of Microbiology**

Includes concurrent exposure of Core Program reference materials of the metallic, polymeric, and ceramic families to microorganism attachment and calibrated detachment conditions, followed by documentation of the relative retention efficiencies and differential expressions of surface adhesive proteins.

Note: Original accepted proposal anticipated significant Core Program support and coordination, specifically regarding provision of adequate supplies of characterized, sterile materials and post-exposure examinations of the consequences (at "conditioning film" and "retained cell" levels) of bacterial attachment/detachment events.

Surface Modification of Various Polymeric Substrata by One-step Photo-grafting of Hydrophilic Polymers

Professor P. Kumler
Department of Chemistry

This project will investigate both the process of photografting to substrata polymers and some graftable monomers which are of biological/biomedical interest. We will originally restrict our studies to polyethylene terephthalate as substratum based on positive early results. The versatility and utility of photoinduced grafting will be examined using acrylamide (I) and both monosubstituted and disubstituted (on nitrogen) acrylamide derivatives (II and III).



I



II

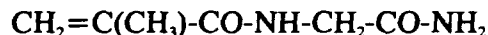


III

Two additional monomers to be investigated are N-acrylylglycinamide (IV) and N-methacrylylglycinamide (V):



IV



V

The eventual goal of the project is grafting onto various substrata of pentapeptide YIGSR (tyrosine-isoleucine-glycine-serine-arginine).

Note: This project is funded by a supplemental NSF grant to IUCB for research carried out in predominantly undergraduate institutions. Most of the planned studies will be performed by Professor Kumler with the aid of undergraduate students at SUNY Fredonia.

Principal Investigator

NSF - IUCRC FOR BIOSURFACES

Robert E. Baier Research Professor, Biophysical Sciences 10/31/39
Associate Professor, Biomaterials

EDUCATION

Cleveland State University	BES	1962	Engineering Science
University at Buffalo	PhD	1966	Biophysics

RESEARCH AND PROFESSIONAL EXPERIENCE

Adjunct Associate Professor, Department of Mechanical and Aerospace Engineering, School of Engineering and Applied Sciences, State University of New York at Buffalo

Associate Professor, Biomaterials, Faculty of Health Sciences, State University of New York at Buffalo, 1990-present

Director, New York State Center for Advanced Technology, Health-care Instruments and Devices Institute (HIDI), State University of New York at Buffalo, 1985-89.

Research Professor, Biophysical Sciences, School of Medicine and Biomedical Sciences, State University of New York at Buffalo, 1983-Present.

Staff Scientist, Advanced Technology Center, Arvin/Calspan (formerly Cornell Aeronautical Laboratory of Cornell University), Buffalo, NY, 1968-84.

Research Chemist, U.S. Naval Research Laboratory, Washington, DC, 1966-68.

Award for Innovation in Medical Devices (International Competition, peer-jury, \$50,000 prize donated by Pfizer Hospital Products Corporation), through American Society for Artificial Internal Organs, 1987.

Distinguished Service Award, jointly presented by Society for Applied Spectroscopy and Western New York Section, American Chemical Society (Analytical Division), 1987.

Clemson Award for Basic Research; National Award of Society for Biomaterials, 1983.

RESEARCH AND PROFESSIONAL EXPERIENCE (continued)

Society of the Sigma Xi (Cornell University Chapter), elected 1972.

Diplomate, American Academy of Environmental Engineers, 1971.

Union Carbide Chemicals Prize, National Award of American Chemical Society, 1971.

New York Academy of Sciences, elected 1969.

SELECTED PUBLICATIONS

Baier, R.E. and Meyer, A.E., 1991, Aspects of Bioadhesion, Chapter 15 in Fundamentals of Adhesion, L.-H. Lee, ed., Plenum Publishing Corporation, pp 407-425, 1991.

Vargo, T.G., Hook, D.J., Gardella, J.A., Eberhardt, M.A., Meyer, A.E., and Baier, R.E., A Multitechnique Surface Analytical Study of a Segmented Block Copolymer Poly(ether-Urethane) Modified through an H₂O Radio Frequency Glow Discharge, 1991, J. Polymer Sci., Part A: Polymer Chemistry, 29:535-545, 1991.

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Olivieri, M.P., Loomis, R.E., Meyer, A.E., and Baier, R.E., Surface Characterization of mussel adhesive protein films, J. Adhesion Sci. Technol., 4(3):197-204, 1990.

Baier, R.E., Improvement of Adhesion in the Intraoral Environment by Glow Discharge-Treatment (GDT) Techniques, Transactions of the Academy of Dental Materials, 3:6-29, 1990.

Vrolijk, N.H., Targett, N.M., Baier, R.E., and Meyer, A.E., Surface Characterization of Two Gorgonian Coral Species: Implications for a Natural Antifouling Defence, Biofouling, 2:39-54, 1990.

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Baier, R.E., Adhesives in Medicine, in Concise Encyclopedia of Medical & Dental Materials, D. Williams, ed., Pergamon Press, New York, pp 24-27, 1990.

Baier, R.E., Control of Bioadhesion by the Zebra Mussel, in Proceedings, International Zebra Mussel Research Conference, December 5-7, Columbus, OH, sponsored by the Great Lakes Sea Grant Network, pp 14-15, 1990.

Palmer, G.R. and Baier, R.E., Surface chemistry and physical strength of radiation-treated suture materials, in Development and Design with Advanced Materials, G.C. Sih, S.V. Hoa, and J.T. Pindera, eds., Elsevier, Amsterdam, pp 227-235, 1990.

Principal Investigator

NSF - IUCRC FOR BIOSURFACES

Joseph A. Gardella, Jr.

Professor, Chemistry and
Biomaterials

08/22/55

EDUCATION

Oakland University	BS	1977	Chemistry
Oakland University	BA	1977	Philosophy
University of Pittsburgh	PhD	1981	Analytical Chemistry

RESEARCH AND PROFESSIONAL EXPERIENCE

Professor, Chemistry and Biomaterials Department, State University of New York at Buffalo, 1992-Present.

Associate Professor, Biomaterials Department, State University of New York at Buffalo, 1991-1992.

Associate Professor, Chemistry Department, State University of New York at Buffalo, 1987-Present.

Research Assistant Professor, Stomatology and Interdisciplinary Sciences, School of Dental Medicine, State University of New York at Buffalo, 1987-Present.

Senior Member, Undergraduate College, State University of New York at Buffalo, 1988-Present.

Associate Director, Surface Science Center, State University of New York at Buffalo, 1985-1989.

Assistant Professor, Chemistry Department, State University of New York at Buffalo, 1982-87.

Faculty Intern, Chemistry Department, University of Utah, 1981-82.

Research Assistant, Surface Analysis Group, University of Pittsburgh, 1977-81.

Lawrence M. Gelb Foundation Fellow, Bristol Myers Corporation, 1986-89.

Exxon Educational Foundation Fellow, 1989-1991.

SELECTED PUBLICATIONS

F. V. Bright, K. S. Litwiler, T. G. Vargo and J. A. Gardella, Jr. "Enhanced Performance of Fibre-Optic Immunoprobes Using Refunctionalized Fluoropolymers as the Substratum", *Analytica Chimica Acta*, **1992**, in press.

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X. Chen, P. L. Kumler and J. A. Gardella, Jr. "FTIR and ESCA Studies of Block Copolymers of Styrene and Dimethyl Siloxane", *Macromolecules*, submitted August, 1991.

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H. F. Lee and J. A. Gardella, Jr. "Multitechnique Surface Analysis of Poly(N-Vinylpyridine-Co-Styrene) and Poly(N-Vinylimidazole-Co-Styrene) Random Copolymers", *Polymer*, **1992**, accepted, in press.

ASSOCIATED FACULTY

NSF - IUCRC FOR BIOSURFACES

Dr. David Anderson, Assistant Professor of Biomaterials. Received Ph.D. in Chemical Engineering from University of Minnesota (1986). Research focuses on materials and surface phenomena.

Dr. Frank V. Bright, Associate Professor of Chemistry. Received Ph.D. from Oklahoma State University in Analytical Chemistry (1985) and continued with postdoctoral studies in Analytical Laser Spectroscopy at Indiana University until 1987. Since 1987, on the faculty of SUNY-Buffalo. Research efforts center on 1) instrumentation for chemical analysis; 2) quantifying the interfacial processes occurring at the distal ends of fiber-optic sensors and probes; 3) steady-state and dynamic (time-resolved) fluorescence applied to bioanalytical problems; 4) elucidation of the fundamental processes that govern complexation phenomena in organized media; and 5) improving understanding of solvation in supercritical fluids.

Dr. John H. Campbell, Assistant Professor of Oral and Maxillofacial Surgery. Received D.D.S. in 1981 from the State University of New York at Buffalo, School of Dental Medicine. In 1986 completed residency program in Oral and Maxillofacial Surgery, University of Rochester, Strong Memorial Hospital. Board Certified Oral Surgeon. Research focuses on the in vitro effects of metals, polymers and ceramics on cells from normal populations and carcinomas.

Dr. Keith E. Cooksey, Professor of Microbiology and Biochemistry, Montana State University. Received Ph.D. in 1959 from the University of Birmingham, England, in Biochemistry and was a postdoctoral fellow of the National Research Council of Canada from 1959 to 1960. In addition to academic appointments, spent 1965-1968 as a Senior Scientist with Shell Research Ltd. in England. Senior Scientist for Microbiology and Biochemistry, Office of Naval Research, Europe, 1989-1990. Primary research interests are mechanisms of the interactions of cells with surfaces, and algal biotechnology.

Dr. Scott Diamond, Assistant Professor of Chemical Engineering. Received Ph.D. from Rice University in Biomedical Engineering (1990). Research interests include: (i) endothelial biomechanics, (ii) structure, function, and cellular expression of adhesion and receptor proteins in hydrodynamic environments, and (iii) blood coagulation and fibrinolytic pathways under flow conditions. These investigations utilize fluorescence video microscopy, mammalian cell culture, immunoassays, and molecular biology techniques.

Dr. Robert Good, Professor of Chemical Engineering. Received Ph.D. in 1950 from University of Michigan and an M.S. from the University of California, Berkeley, both in Chemistry. Recipient of the Kendall Award for Surface and Colloid Chemistry. Theoretical studies of contact angle measurements include protein solubility, polymer solubility, polymer solubility and phase separation, cell membrane fusion, hydrophobic bonding and hydrogen bonding, adhesion.

Dr. Philip Kumler, Professor of Chemistry at SUNY College at Fredonia. Received Ph.D. in organic chemistry (1967) at the University of Rochester. Research interest in productivity of synthetic organic chemistry, applied photo chemistry, organic and physical polymer science and surface science.

Dr. Gordon A. McFeters, Professor of Microbiology, Montana State University. Received a Ph.D., 1967, in Microbiology from Oregon State University, following M.S. from Loma Linda University, 1963. Performed research at the Swiss Federal Institute for Water Resources and Water Pollution Control, 1987-1988. Research interests include water and wastewater microbiology, physiology of waterborne bacteria, microbial ecology, and biodegradation in soil and groundwater.

Dr. Joseph Merrick, Professor of Microbiology. Received Ph.D. from University of Michigan in Biochemistry (1958). Research focuses on the identification of virulence factors that are involved in S. typhimurium pathogenesis; to define molecular mechanisms involved in adhesion and invasion of epithelial cells by this organism.

Dr. Anne Meyer, Principal Research Scientist, IUCB. Received Ph.D. from Lund University (Sweden) in 1990. Was Associate Director of the University's Surface Science Center, 1985-1989 and of the NYS Center for Advanced Technology in Health-care Instruments and Devices. Prior experience was as analytical chemist at Arvin/Calspan (1974-1986), serving as Head of the Advanced Technology Center's Surface Science Section from 1983 to 1986.

Dr. George H. Nancollas, Distinguished Professor of Chemistry. Received Ph.D. from the University of Wales and D.Sc. from the University of Glasgow (1963). Since 1965, has been on the faculty of the University at Buffalo investigating the kinetics of crystallization and dissolution, and the thermodynamics of mineral species in complex environments. Professor Nancollas has been recognized by the American Chemical Society with the 1977 Jacob Schoellkopf Medal and by the International Association for Dental Research with the 1984 Basic Research in Biological Mineralization Award.

Appendix B. Undergraduate Student Supported as NSF Women, Minority, and Disabled Engineering Research Assistant

BELINDA S. MARTINEZ

3824 North Ridge Road
Lockport, NY 14094
(716) 434-7179 can be reached after 6 pm.
(716) 772-7177 Leave message.

OBJECTIVE To obtain an entry level chemistry position in an organization seeking an individual who has strong personal drive, a background in instrumentation, and the ability to learn quickly.

EDUCATION **STATE UNIVERSITY OF BUFFALO** Buffalo, NY
B.A., Chemistry, 01/91-05/92

NIAGARA COUNTY COMMUNITY COLLEGE Sanborn, NY
A.A.S., Chemical Laboratory Technology, 09/88-12/90

HONORS Awarded the NSF "Women, Minority, and Disabled Engineering Research Assistant Program" Fellowship; American Chemical Society Certified

RELEVANT EXPERIENCE **INDUSTRY/UNIVERSITY COOPERATIVE RESEARCH CENTER FOR BIOSURFACES** Buffalo, NY
01/92 - 05/92 *Research Technician*

- Worked on the surface preparation of stainless steel and titanium samples for distribution to other investigators.
- Assisted in quality control of specimens through surface analysis by SEM and ESCA.

05/90 - 08/91 **E B ASSOCIATES LABORATORIES, INC.** Amherst, NY
Chemical Laboratory Technician

- Assisted PhD. in the deformation by various methods of analysis of competitors' technologies in the coatings, plastic and health care product industries.
- Performed quality assurance testing by means of FTIR and DSC.
- Experienced with PC software: DBase, wordperfect, and supercalc.

ADDITIONAL INFORMATION Computer knowledge gained through business and personal applications.
Able to relocate and willing to travel.

ACTIVITIES Participated in the Cambria's Fire Hall Lady Auxiliary. Donor in the American Red Cross program. Volleyball.

AVAILABILITY June 1992

REFERENCES References available upon request.

Appendix C. RUI/PUI Report

Philip L. Kumler
January 1, 1992 - May 30, 1992

BRIEF OVERVIEW OF RESEARCH PROGRESS:

At the current time we have demonstrated successful grafting of seven different monomers onto poly(ethylene terephthalate), PET. The grafted monomers are: acrylamide, N-isopropylacrylamide, N,N-dimethylacrylamide, methacrylamide, N-hydroxymethylacrylamide, methacrylonitrile, and hydroxyethyl acrylate. For some of these systems the experimental conditions have been varied to determine the conditions for maximum grafting. Grafting has been confirmed and analyzed by ESCA, ATR-FTIR, and contact angle.

A comprehensive study (as an M.S. thesis) of the grafting of acrylamide on to surface-treated polyolefins is nearing completion. Acrylamide can be successfully grafted onto both flame and corona pretreated high-density polyethylene (HDPE) and also onto both flame and corona pretreated polypropylene, PP. Under the conditions used in our grafting protocol there is little or no grafting onto unmodified HDPE or PP.

A systematic survey of the potential utility of thermal analysis methods for analyzing grafted materials is nearing completion. Differential scanning calorimetry (DSC) does not distinguish grafted from ungrafted materials; essentially identical glass transition temperatures are observed. Thermogravimetric analysis (TGA) also does not distinguish grafted from ungrafted materials; both materials give essentially identical thermal decomposition profiles. However, thermomechanical analysis (TMA) does show significant differences between grafted and ungrafted materials. This technique, in addition to detecting and determining the difference in thickness between grafted and ungrafted materials, reveals different glass transition temperatures for grafted than for ungrafted. We believe this is because the TMA experiment (using a penetration probe) is primarily sensing the glass temperature of the surface of the grafted material.

STUDENT INVOLVEMENT:

From the initiation of this project and including the students currently involved during the summer of 1992, a total of eight undergraduates and one graduate student have been participants. Most of these students have appeared as co-author on at least one research presentation (details in next section).

The status of the students that have been involved is as follows:

JASON NOWAK: Received BS in chemistry in December 1990; commissioned in the U.S. Army; currently on station in Germany.

LINDA SLAPELIS: Received BS in chemistry in May 1991; has completed one year in the M.S. program in Materials Science at Rochester Institute of Technology.

MIKE FLAITSZ: Received B.S. in chemistry in May 1992. A current (summer 1992) participant in project; seeking industrial employment.

PATRICK DePALMA, Jr.: Will complete B.S. in chemistry in December 1992; will attend graduate school in chemistry.

SUELLEN SACK: Will complete B.S. in chemistry in May 1993. During the current summer she is a participant in an NSF-sponsored undergraduate research program in polymers at Virginia Tech in Blacksburg, VA. Will attend graduate school in chemistry.

DEANNA NUSZKOWSKI: Will complete B.S. in chemistry in May 1993. Is a current participant in my summer research program. Plans to attend graduate school.

DONALD HIGGS: Will complete B.S. in chemistry in May 1993. Is a current participant in my summer research program. Plans to attend medical school.

KELLIE IRISH: Received her B.S. in chemistry in May 1992. Is a current participant in my summer research program. Is seeking industrial employment.

PAUL JELONEK: Is nearing completion of his M.S. under my supervision; should complete degree by August 1992. Employed full-time (product development) at company manufacturing inks and pigments.

PRESENTATIONS AND PUBLICATIONS:

At this time no manuscripts have been submitted to refereed journals but several are in the planning stages. It is expected that at least one will be submitted by September 1, 1992.

A number of presentations have been made by students. The following presentations and abstracts are relevant.

(a) "Surface Modification of Poly(Ethylene Terephthalate) by Photo-Induced Grafting of Polyacrylamide", Michael Flaitz and Jason J. Nowak. Presented at Eastern Colleges Science Conference. Fredonia, NY, April 1991.

(b) "Photoinduced Graft Polymerization of N,N-Dimethylacrylamide on Poly(Ethylene Terephthalate); Patrick A. DePalma, Jr. and Linda A. Slapelis. Presented at Eastern Colleges Science Conference, Fredonia, NY, April 1991.

(c) Mike Flaitz, Pat DePalma, and Suellen Sack presented a poster at the annual meeting of the corporate sponsors of the Industry/University Center for Biosurfaces at the University of Buffalo in January 1992.

(d) A paper entitled "Thermomechanical Analysis (TMA) Studies of Poly(ethylene terephthalate) Grafted with Various Hydrophilic Polymers" was presented at the 1992 ENY-ACS Undergraduate Research Symposium (Siena College, April 1992) by Mike Flaitz.

(e) A paper entitled "Photoinduced Grafting of Acrylamide and Derivatives Onto Poly(Ethylene Terephthalate)" was presented at the 1992 ENY-ACS Undergraduate Research Symposium (Siena College, April 1992) by Patrick DePalma, Jr.

(f) A paper entitled "Photoinduced Grafting of Polyacrylamide Onto Surface-Treated Polyolefins" will be presented at the Northeast Regional Meeting of the American Chemical Society in June 1992 in Syracuse. The paper will be presented by graduate student Paul Jelonek.

(g) "Surface Modification of PET by One-Step Photografting of Hydrophilic Polymers". Patrick A. DePalma, Jr., Michael Flaitz, Linda Slapelis, and Philip L. Kumler. Accepted for presentation at the National ACS meeting in August 1992. Will appear in Polymer Preprints.

(h) "Surface Modification of Various Polymeric Substrates by One-Step Photografting of Hydrophilic Polymers". P. DePalma, Jr., M. Flaitz, D. Nuskowski, S. Sack, Philip L. Kumler, Joseph A. Gardella, Jr. Poster accepted for presentation at the Polymer Surfaces and Interfaces workshop to be held in Danvers, MA in October 1992.

MEMBERS ADVISORY BOARD MEETING

January 28 and 29, 1992
Members, NSF, and Invited Faculty
204 Parker Hall (IUCB Conference Room)
South Campus

Tuesday - January 28, 1992

Chairman: Dennis Goupil (American Cyanamid)
Facilitator: Bob Baier

- 8:00 am CONTINENTAL BREAKFAST
- 8:30 am MEETING GOALS/MAB ROUND TABLE
- 9:30 am REVIEW: CENTER PROGRESS AGAINST GOALS--WHERE ARE WE NOW?--
WHAT IS BEHIND US? - *R. Baier*
- 10:30 am COFFEE BREAK
- 10:45 am RESEARCH PROGRESS BRIEFINGS RELEVANT TO PROPOSAL REVIEW
(Five half-hour presentations, each with fifteen additional minutes for question and answer period, to
provide collective overviews of all center-sponsored research in these topical areas)
1. Materials and Methods - *J. Gardella, Jr.*
- 11:30 am 2. Cell/Surface Interactions - *J. Campbell*
- 12:15 pm LUNCH
- 1:15 pm RESEARCH PROGRESS BRIEFINGS RELEVANT TO PROPOSAL REVIEW
(continued)
3. Bacterial and Diatoms Adhesion Studies - *K. Cooksey*
- 2:00 pm 4. Proteins at Interfaces - *G. Nancollas*
- 2:45 pm 5. Surface Energy Influences - *R. Baier*
- 3:30 pm COFFEE BREAK

Tuesday - January 28, 1992, continued

- 3:45 pm INTEGRATED RESEARCH EFFORTS--WHAT DO WE NEED TO ADD?-- WHAT IS IN FRONT OF US? - *J. Gardella, Jr.*
- 5:00 pm ADJOURN UNTIL POSTER SESSION
- 6:30-9:00 pm RECEPTION AND POSTER SESSION WITH FACULTY, STUDENTS, AND RESEARCH SUPPORT SPECIALISTS - *Holiday Inn, Amherst*
- 8:00 pm RESEARCH REVIEW OF NSF/IUCB SPONSORED PROJECT AT SUNY FREDONIA: Surface Modification of Various Polymeric Substrata by One-step Photografting of Hydrophilic Polymers - *P. Kumler*

Wednesday - January 29, 1992

Chairman: Dennis Goupil (American Cyanamid)
Facilitator: Joseph Gardella, Jr.

- 8:15 am CONTINENTAL BREAKFAST
- 8:30 am MAB ROUND TABLE: FOCAL ISSUES
- 10:30 am COFFEE BREAK
- 10:45 am PROPOSAL RANKING SESSION
- 12:00 noon LUNCH
- 1:00 pm MAB EXECUTIVE SESSION - *MAB, NSF Representative, and Evaluator only*
- 3:00 pm COFFEE BREAK
- 3:15 pm MAB RECOMMENDATIONS TO PROGRAM OFFICE: ACTION ITEMS
- 5:00 pm MEETING ADJOURNED

INDUSTRY/UNIVERSITY CENTER FOR BIOSURFACES

SEMI-ANNUAL MEETING

JUNE 22-24, 1992

AGENDA

Monday, June 22nd - Martin Room, 567 Capen Hall, North Campus, SUNYAB

- | | |
|-------------------------|---|
| 11:30 a.m. - 12:30 p.m. | Registration and Buffet Lunch |
| 12:30 p.m. - 12:45 p.m. | Welcome and Introductions |
| 12:45 p.m. - 1:15 p.m. | National Science Foundation Investment Strategies for Industry/University and International Cooperative Research - A. Schwarzkopf |
| 1:15 p.m. - 1:30 p.m. | Economic and Intellectual Property Benefits of Joint Industry/University Programs - E. Zablocki |
| 1:30 p.m. - 1:45 p.m. | Structure and Organization of the Industry/University Center for Biosurfaces - J. Gardella, Jr. |

CURRENT STATE-OF-THE-ART SUMMARIES

- | | |
|-----------------------|--|
| 1:45 p.m. - 2:30 p.m. | "State-of-the-Art I: Review of May, 1992
NATO Advanced Study Institute in Portugal" - K. Cooksey
Questions/Discussion |
| 2:30 p.m. - 2:45 p.m. | Coffee Break |
| 2:45 p.m. - 3:30 p.m. | "State-of-the-Art II: Review of May, 1992
International Symposium on Surface Properties of Biomaterials, Manchester, United Kingdom" - J. Gardella, Jr.
Questions/Discussion |
| 3:45 p.m. - 4:15 p.m. | "State-of-the-Art III: Preview of June, 1992
FDA Infection Control Symposium -- Tailoring Surface Properties" - A. Meyer
Questions/Discussion |
| 4:30 p.m. - 5:00 p.m. | "State-of-the-Art IV: Highlights from 4th World Biomaterials Congress in Berlin, Germany -- April, 1992" - R. Baier |

5:00 p.m. - 5:15 p.m. Role of the IUCB in Integrating these Findings for
Sponsoring Members - open discussion with Center Co-
Directors

Monday Evening, June 22nd - Change of Venue: HOLIDAY INN - Amherst/Niagara Room

7:00 p.m. - 9:00 p.m. Poster Session, Cocktails and Buffet

(Enjoy an informal social program around technical posters illustrating recent,
nonproprietary findings of Center-associated faculty and students)

Tuesday, June 23rd - South and North Campuses, SUNYAB

8:30 a.m. - 4:30 p.m. Tours of Center facilities arranged upon request for visiting
company/agency representatives

Martin Room, 567 Capen Hall, North Campus, SUNYAB

8:30 a.m. - 12:00 p.m. Closed Working Session for Current Center Members
(Technical Project Presentations by Faculty)

12:00 p.m. - 1:00 p.m. Lunch Break

1:00 p.m. - 5:30 p.m. Closed Session Continued

7:00 p.m. MAB Executive Session/Dinner at Holiday Inn

Wednesday, June 24th Holiday Inn/Niagara Room

8:30 a.m. - 10:30 a.m. Breakfast and Executive Session, including IUCB Co-
Directors, Evaluator

10:30 a.m. - 10:45 a.m. Coffee Break

10:45 a.m. - 12:00 noon Executive Session continues

12:30 p.m. - 1:30 p.m. Working Lunch

2:00 p.m. Optional Session

MEMBERS ADVISORY BOARD MEETING

June 23 and 24, 1992

Tuesday - June 23, 1992

Closed Session

567 Capen Hall (Jeannette Martin Room)
North Campus

8:30 - 8:45 a.m. COFFEE/CONTINENTAL BREAKFAST

8:45 a.m. TECHNICAL SESSION I
Chair: *Karen Howard-Nordan*
Facilitator: *Bob Baier*

Opening Remarks from the Chair

9:00 a.m. PROGRESS ON CORE PROGRAM REFERENCE MATERIAL
PREPARATION - *Terry Vargo*

9:45 a.m. PROGRESS ON CORE PROGRAM REFERENCE MATERIAL
STERILIZATION - *Anne Meyer*

10:30 a.m. COFFEE REFRESHER

10:45 a.m. PROGRESS ON CORE PROGRAM REFERENCE MATERIAL
PACKAGING - *Joe Gardella*

11:15 a.m. TECHNICAL PROGRESS AT MONTANA STATE UNIVERSITY - *Keith Cooksey*

12:00 NOON LUNCH SERVED IN MARTIN ROOM

1:00 p.m. TECHNICAL SESSION II
Chair: *Karen Howard-Nordan*
Facilitator: *Joe Gardella*

SUMMARY OF TECHNICAL SESSION I, WITH REQUESTS FOR
CLARIFICATIONS TO BE PROVIDED BY WEDNESDAY MORNING -
Karen Howard-Nordan

Tuesday - June 23, 1992, continued

- 1:30 p.m. OVERVIEW OF PROGRESS IN " BIOLOGICAL CHALLENGE " PROJECTS - *Anne Meyer*
- 1:50 p.m. BACTERIAL RETENTION AND ELUTION STUDIES - *Joe Merrick*
- 2:10 p.m. NORMAL AND MALIGNANT CELL ADHESION/GROWTH STUDIES - *Jack Campbell*
- 2:30 p.m. DIATOM AND BACTERIAL ATTACHMENT/PHYSIOLOGY STUDIES - *Keith Cooksey* (also presenting *G. McFeters* results)
- 3:00 p.m. COFFEE BREAK
- 3:20 p.m. ADVANCES IN CORRELATING SURFACE ENERGY THEORY WITH CELL ADHESION RESULTS - *Bob Good*
- 3:40 p.m. EARLY PROGRESS IN POLY-HYDROXYMETHYLMETHACRYLATE/ CUBIC PHASES - *David Anderson*
- 4:00 p.m. IMMUNO-STAINING STUDIES IN CELL ADHESION SYSTEMS - *Scott Diamond*
- 4:20 p.m. THIN-LAYER IMMUNOASSAY : UPDATE OF ISSUES/PROGRESS - *Bob Baier*
- 4:40 p.m. OVERVIEW OF PROGRESS IN SURFACE ANALYSIS BY ULTRA-HIGH VACUUM, CONSTANT COMPOSITION, AND FLUORESCENCE SPECTROSCOPY - *Joe Gardella* (also presenting results of *G. Nancollas/F. Bright*)
- 5:30 p.m. *Adjourn Technical Sessions*
- 7:00 p.m. PRIVATE EXECUTIVE SESSION FOR MEMBERS ADVISORY BOARD, WITH NATIONAL SCIENCE FOUNDATION REPRESENTATIVE AND EVALUATOR
- HOLIDAY INN - AMHERST, BOULEVARD ROOM, DINNER SERVED***
- ***Please indicate choice of Chicken Kiev or Prime Rib entree

MEMBERS ADVISORY BOARD MEETING

June 23 and 24, 1992

Wednesday - June 24, 1992

Closed Session

Niagara Room (Holiday Inn)
1881 Niagara Falls Blvd.
Amherst, NY 14228

8:30 a.m. - 2:00 p.m.

EXECUTIVE SESSION WITH IUCB CO-DIRECTORS AND MONTANA AND NSF REPRESENTATIVES (+ any additional participants nominated by MAB)

Chair: Karen Howard-Nordan

Facilitator: Keith Cooksey

8:30 a.m. BREAKFAST SERVED

1. Discussion of proposed services-in-kind projects (in lieu of cash contribution for 1992 membership year) to be performed by GIBCO and Davis & Geck.
2. MAB affirmation of proposed GIBCO and Davis & Geck projects, modified as necessary in accord with prior discussion.
3. MAB discussion of progress in " biological challenge " aspects of IUCB program.
4. MAB approval of "second-increment" funding of project of Professor Joseph Merrick, to completion date of January, 1993.
5. MAB approval of continued funding, from NSF grant, of effort at Montana State University.
6. Discussion of enlarged/enhanced relationship between programs at SUNY Buffalo and Montana State University.

10:30 a.m. COFFEE REFRESHER, and select lunch choice from "check-off" menu

7. Consideration of further funding of projects on poly-HEMA (Anderson), immuno-staining (Diamond), Contact Angle Theory (Good), Physical/Chemical Support of Biological Attachment Studies (Meyer).

Wednesday - June 24, 1992, continued

8. Required mid-course corrections for ongoing IUCB projects.
9. Potential November, 1992 meeting in Buffalo to develop technical/business plan for next 5-years of Center activities.
10. Scheduling/rescheduling of January, 1993 proposal review MAB meeting to different dates/venues.

12:30 p.m. WORKING LUNCH AND EXECUTIVE SESSION WRAP-UP

2:00 p.m. ADJOURN

Appendix E. Graduate Research Students and Faculty Advisers

FACULTY & STUDENTS

STUDENT	EXPECTED DATE OF AWARD	DEGREE	RESEARCH AREA
Dr. Robert E. Baier			
Martin Casstevens	1992	Ph.D.	Thin-Film Biosensors
William Cherry	1992	M.S.	Sterilization Effects on Orthodontic Cutting Pliers
Laura Edsberg	1993	Ph.D.	Wound Healing as a Function of Biomechanical Factors
Michael Hayes	1992	M.S.	Tissue-Polymer Composites
James Malone	1992	M.S.	Surface Treatment of Hydroxyapatite Implants
Patrick McCabe	1992	M.S.	Composite Restorative Materials
Marion Olivieri	1992	Ph.D.	Protein Structure at Interfaces
Gary Palmer	1992	Ph.D.	Radiation Interactions with Polymers

STUDENT	EXPECTED DATE OF A'ARD	DEGREE	RESEARCH AREA
Dr. Frank V. Bright			
Evan Bekos	1995	Ph.D.	Novel Substrata for Chemical Sensing
Thomas Betts	1992	Ph.D.	Solvation Dynamics in Supercritical Fluids
Gino Catena	1991	Ph.D.	Cyclodextrin Studies and Fiber-Optic Based Sensors
Richard Dunbar	1995	Ph.D.	Fiber-Optic Chemical Sensing
Jingfan Huang	1991	Ph.D.	Dynamics of Inclusion Complex Formation
Kevin Litwiler	1991	Ph.D.	Fiber-Optic Sensors and Studies of Surface Immobilized Reagents
Upucn Narang	1995	Ph.D.	Novel Substrata for Chemical Sensing
Jeanette Rice	1995	Ph.D.	Solvation in Supercritical Fluids
JoAnn Zagrobelny	1992	Ph.D.	Supercritical Fluid Solvation Kinetics
Jing Zhang	1992	Ph.D.	Dynamics in Organized Media

STUDENT	EXPECTED DATE OF AWARD	DEGREE	RESEARCH AREA
Dr. Joseph A. Gardella, Jr.			
Gary L. Jones	Senior Research Support Specialist		Model Biocorrosion of 316L Stainless Steel
Yangsun Kim Jo	Postdoctoral		Time of Flight SIMS of Model Biopolymer/Substrate Interactions
Terrence Vargo (Joint with R.E. Baier)	Postdoctoral		Effect of Sterilization on the Surface Chemistry of Substrata
Cindy Burkhardt	1992	Ph.D.	Kinetic Study of the Surface Hydrolysis of Polylactide; Surface Science of Polymer Blends
Xin Chen	1993	Ph.D.	Surface Science of Block Copolymers
Raghuram Dasari	1992	B.S.	Plasma Modification of Polymer
Norma DeGatica	1993	Ph.D.	Surface Science of Biopolymers on Modified Titanium
Robert Johnson	1993	Ph.D.	Quantitative SIMS of Langmuir Blodgett Film/Metal Interfaces
Helen Lee - Graduated 1/27/92 (Thesis information available)	1992	Ph.D.	Surface Science of Random and Block Functional Copolymers
Jianxin Li	1993	Ph.D.	Quantitative SIMS Langmuir Blodgett Films of Fatty Amine and Fatty Acids Monolayers
Clara Lo	1995	Ph.D.	Surface Science of Titanium
Patrick Schamberger	1993	Ph.D.	Surface Science of Modified Poly- styrene and Biopolymers on Poly- styrene; UHV Studies of Poly HEMA
Rick Spring	1992	B.S.	Surface Hydrolysis of Poly Caprolactone
Cara Weitzsacker	1992	Ph.D.	Quantitative Electron and Ion Spectroscopy of Complex Model Systems: LB Films and Coal
Evan Bekos (Joint with F.V. Bright)	1995	Ph.D.	Surface Modification of Polymers for Cell Attachment and Growth
Yuezhong Du	1995	Ph.D.	Surface Science of Metal Organic Interfaces
Belinda Martinez	1992	B.S.	Biocorrosion of Ti and TiAlV Surfaces

STUDENT	EXPECTED DATE OF AWARD	DEGREE	RESEARCH AREA
Dr. George H. Nancollas			
Eileen Burke	1994	Ph.D.	Calcium Phosphates
Vincent Cannavo	1992	M.S.	Gypsum Crystal Growth
Aileen Chin	1992	Ph.D.	Calcium Phosphates
Bruce Elder	1992	Ph.D.	Crystal Growth
Tristan Fuierer	1994	Ph.D.	Calcium Phosphates
Linda Kelash	1992	Ph.D.	Gypsum Hydrate Physical Growth
Eleftherios Paschalis	1992	M.S.	Biom mineralization
Jian Tan	1994	Ph.D.	Biom mineralization
Brian Tucker	1993	Ph.D.	Physical Chemistry Crystal Growth

Appendix F. Regarding the Use of Human Subjects and Laboratory Animals in this Research Program

HUMAN SUBJECTS

This is a research program for which plans for inclusion of human subjects are not definite. A certification of Institutional Review Board (IRB) review and approval of research involving human subjects will be provided before the activity begins if certification has not already been filed.

The State University of New York at Buffalo has an approved assurance of compliance on file with HHS which covers this activity (assurance identification number: M-1270; IRB identification number: -01).

LABORATORY (VERTEBRATE) ANIMALS

This is a research program for which plans for the use of vertebrate animals are not definite. It is likely that some projects will require the use of laboratory animals and will require approval of the University's Laboratory Animal Care Committee prior to any implantation or other surgical procedures. When the specific projects are identified, verification of the dates of the Committee's approvals will be submitted immediately to the appropriate monitoring office.

The Laboratory Animal Care Committee of the State University of New York at Buffalo operates under an approved Animal Welfare Assurance (identification number: A3354-01).

Appendix G. Current and Pending Support, Co-Directors

**CURRENT AND PENDING SUPPORT FOR RESEARCH AND
EDUCATION IN SCIENCE AND ENGINEERING**

**Robert E. Baier
Joseph A. Gardella, Jr.**

<u>Agency</u>	<u>Title</u>	<u>Total Cost (Direct Cost) (Annual Rate)</u>	<u>Period Covered by Award</u>	<u>Percent Effort</u>	<u>ACAP</u>	<u>SUMM</u>
<u>Current Support</u>						
NSF IUCRC Engineering	Industry/University Cooperative Research Center for Biosurfaces R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	\$80,000 80,000 80,000 75,000 75,000	09/01/88-08/31/93	5 5	5 5	5 5
ONR Oceanic Biology	Core Scientific Effort for Biosurface Studies (Task 1) R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	40,000 40,000 40,000	07/01/88-06/30/92	5 5	5 5	5 5
GIBCO, Becton Dickinson, Procter and Gamble	Industry Membership Supplement for Industry University Center for Biosurfaces R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	120,000	02/01/91-01/31/92			
Becton Dickinson, Procter and Gamble	Industry Membership Supplement for Industry University Center for Biosurfaces R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	80,000	02/01/92-01/31/93			
				5 5	5 5	5 5

Agency	Title	Total Cost (Direct Cost) (Annual Rate)	Period Covered by Award	Percent Effort ACAD SUMM
Bausch and Lomb	Industry Membership Supplement for Industry University Center for Biosurfaces R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	40,000	06/01/92-05/31/93	5 5
R.E. Baier				
ONR Oceanic Biology	Core Scientific Effort for Biosurface Studies (Task 2) R.E. Baier, Co-PI A.E. Meyer, Co-PI	120,000	06/01/89-06/30/92	5 5
NSF IUCB	Reference Material Sterilization and Pre- Exposure Analyses, with Supplemental Dynamic Testing A.E. Meyer, Co-PI R.E. Baier, Co-PI	45,000	02/01/92-01/31/93	5 -
Various Companies	(Targeted Research)	50,000	(various)	5 5
NSF IUCB	Substratum-Induced "Conditioning" Film Changes as Revealed by Thin-Layer Immunoassay	40,000	02/01/91-03/31/92	- -

Agency	Title	Total Cost (Direct Cost) (Annual Rate)	Period Covered by Award	Percent Effort	
				ACAD	SUNM
J.A. Gardella Jr NSF DMR Polymers Program	Ion Beam and Surface Analytical Studies of Macromolecular Surfaces (awarded Two Year Extension for Special Creativity - 1991-1993) J.A. Gardella, Jr., PI	159,600	04/01/91-03/31/93	3	70
NATO	Sampling Depth in Model Polymers by Electron and Ion Spectroscopies J.A. Gardella, Jr., PI J.J. Pireaux, University of Notre Dame de la Paix, Namur, Belgium, Co-PI	11,000	09/01/88-08/31/92	3	3
IUCB Industry	Ultra High Vacuum Surface Analysis of Model Organic and Biological Films on Solid Substrata with Special Emphasis on Reference Material Packaging and Surface Cleanliness Documentation	39,000	02/01/92-01/31/93	-	-
IUCB Industry	Ultra High Vacuum Surface Analysis of Model Organic and Biological Films on Solid Substrata	45,000	02/01/91-03/31/92	-	-

Agency	Title	Total Cost (Direct Cost) (Annual Rate)	Period Covered by Award	Percent Effort ACAD	SUMM
Pending					
National Institutes of Health	Advanced Substrata for Fiber-Optic Immunosensors F.V. Bright, Co-PI J.A. Gardella, Jr., Co-PI	51,864	07/01/91-06/30/92	-	-
Various Companies (IUCB Membership)	U.S. Army R.E. Baier, Co-PI J.A. Gardella, Jr., Co-PI	40,000	01/01/92-12/31/93	-	-

Appendix H. Budget

(SEE INSTRUCTIONS ON
REVERSE BEFORE
COMPLETING) IUCRC Year 5

SUMMARY
PROPOSAL BUDGET

APPENDIX IV

ORGANIZATION		FOR NSF USE ONLY	
The Research Foundation of State University of New York		PROPOSAL NO.	DURATION (MONTHS)
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD NO.	Proposed
Robert E. Baier			Granted
A SENIOR PERSONNEL PI/PO Co PI's Faculty and Other Senior Associates (List each separately with title A-B, show number in brackets)		NSF FUNDED PERSON MOS	FUNDS REQUESTED BY PROPOSER
1 Administrative Assistant (S. Arnold)		6	\$ 14,471
2 Co-Director (J.A. Gardella, Jr.)		1	5,100
3 Evaluator (E. Zablocki)		1.5	5,000
4			
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)			
6. (3) TOTAL SENIOR PERSONNEL (1-5)			24,571
B OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)			
1 () POST DOCTORAL ASSOCIATES			
2 () OTHER PROFESSIONALS (TECHNICIAN PROGRAMMER ETC)			
3 () GRADUATE STUDENTS			
4 () UNDERGRADUATE STUDENTS			
5 (1) SECRETARIAL CLERICAL C. Turley 6 mos.			4,050
6 () OTHER			
TOTAL SALARIES AND WAGES (A-B)			28,621
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 29.5%			8,443
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A-B-C)			37,064
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000.)			
TOTAL PERMANENT EQUIPMENT			
E TRAVEL 1 DOMESTIC (INCL CANADA AND US POSSESSIONS)			2,500
2 FOREIGN			
F. PARTICIPANT SUPPORT COSTS			
1 STIPENDS \$			
2 TRAVEL			
3 SUBSISTENCE			
4 OTHER			
TOTAL PARTICIPANT COSTS			
G OTHER DIRECT COSTS			
1 MATERIALS AND SUPPLIES postage, xerox, meetings, communications			3,819
2 PUBLICATION COSTS/PAGE CHARGES Prospectus			1,500
3 CONSULTANT SERVICES			
4 COMPUTER (ADPE) SERVICES			
5 SUBCONTRACTS Montana State University			22,442
6 OTHER			
TOTAL OTHER DIRECT COSTS			27,762
H TOTAL DIRECT COSTS (A THROUGH G)			67,325
I. INDIRECT COSTS (SPECIFY)			
TOTAL INDIRECT COSTS 11.4% TDC			7,675
J TOTAL DIRECT AND INDIRECT COSTS (H + I)			75,000
K RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPM 252 AND 253)			
L AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			\$75,000
PI/PO TYPED NAME & SIGNATURE		DATE	FOR NSF USE ONLY
Robert E. Baier		1/9/74	INDIRECT COST RATE VERIFICATION
INST. REP TYPED NAME & SIGNATURE		DATE	Date Checked
			Date of Rate Sheet
			Initials - OGC
			Program

SEE INSTRUCTIONS ON
REVERSE BEFORE
COMPLETING)

Montana State University
**SUMMARY
PROPOSAL BUDGET**

APPENDIX IV

ORGANIZATION		FOR NSF USE ONLY			
The Research Foundation of State University of New York		PROPOSAL NO.		DURATION (MONTHS)	
		AWARD NO.		Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD NO.			
Robert E. Baier					
A SENIOR PERSONNEL PI/PO Co PI's Faculty and Other Senior Associates (List each separately with title. A & B show number in brackets)		NSF FUNDED PERSON MOS		FUNDS REQUESTED BY PROPOSER	FUNDS GRANTED BY NSF (IF DIFFERENT)
		CAL.	ACAOBUNA	\$	\$
1					
2					
3					
4					
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
6. () TOTAL SENIOR PERSONNEL (1-5)					
B OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1 () POST DOCTORAL ASSOCIATES					
2 () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER ETC)		6		13,000	
3 () GRADUATE STUDENTS					
4 () UNDERGRADUATE STUDENTS					
5 () SECRETARIAL CLERICAL					
6 () OTHER					
TOTAL SALARIES AND WAGES (A+B)				13,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 27%				3,510	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				16,510	
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000.)					
TOTAL PERMANENT EQUIPMENT					
E TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS)				3,000	
2 FOREIGN					
F. PARTICIPANT SUPPORT COSTS					
1 STIPENDS \$					
2 TRAVEL					
3 SUBSISTENCE					
4 OTHER					
TOTAL PARTICIPANT COSTS					
G OTHER DIRECT COSTS					
1 MATERIALS AND SUPPLIES				2,932	
2 PUBLICATION COSTS/PAGE CHARGES					
3 CONSULTANT SERVICES					
4 COMPUTER (ADPE) SERVICES					
5 SUBCONTRACTS					
6 OTHER					
TOTAL OTHER DIRECT COSTS				2,932	
H TOTAL DIRECT COSTS (A THROUGH G)				22,442	
I. INDIRECT COSTS (SPECIFY)					
TOTAL INDIRECT COSTS 11.4% TDC				2,558	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				25,000	
K RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPM 252 AND 253)					
L AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$25,000	
PI/PO TYPED NAME & SIGNATURE		DATE		FOR NSF USE ONLY	
Robert E. Baier		12/10/92		INDIRECT COST RATE VERIFICATION	
INST. REP. TYPED NAME & SIGNATURE		DATE		Date Checked	Date of Rate Sheet
				Initials - OGC	Program

SEE INSTRUCTIONS ON
REVERSE BEFORE
COMPLETING

SUMMARY
NSF Women, Minority, Disabled, Engineering Supplement
PROPOSAL BUDGET

APPENDIX IV

ORGANIZATION		PROPOSAL NO.		DURATION (MONTHS)	
The Research Foundation of State University of New York				Proposed	Granted
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD NO.			
Robert E. Bair					
A SENIOR PERSONNEL PI/PO Co PI's Faculty and Other Senior Associates (List each separately with title. A & B show number in brackets)		NSF FUNDED PERSON MOS		FUNDS REQUESTED BY PROPOSER	
		CAL	ACAD	FUNDS GRANTED BY NSF (IF DIFFERENT)	
1				\$	
2					
3					
4					
5 () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)					
6 () TOTAL SENIOR PERSONNEL (1-5)					
B OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1 () POST DOCTORAL ASSOCIATES					
2 () OTHER PROFESSIONALS (TECHNICIAN PROGRAMMER ETC)					
3 () GRADUATE STUDENTS					
4 (1) UNDERGRADUATE STUDENTS				4,488	
5 () SECRETARIAL CLERICAL					
6 () OTHER					
TOTAL SALARIES AND WAGES (A+B)				4,488	
C FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				--	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				4,488	
D PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000)					
TOTAL PERMANENT EQUIPMENT					
E TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS)					
2 FOREIGN					
F PARTICIPANT SUPPORT COSTS					
1 STIPENDS \$					
2 TRAVEL					
3 SUBSISTENCE					
4 OTHER					
TOTAL PARTICIPANT COSTS					
G OTHER DIRECT COSTS					
1 MATERIALS AND SUPPLIES					
2 PUBLICATION COSTS/PAGE CHARGES					
3 CONSULTANT SERVICES					
4 COMPUTER (ADPE) SERVICES					
5 SUBCONTRACTS					
6 OTHER					
TOTAL OTHER DIRECT COSTS					
H TOTAL DIRECT COSTS (A THROUGH G)					
I INDIRECT COSTS (SPECIFY)					
TOTAL INDIRECT COSTS 11.4% TDC				512	
J TOTAL DIRECT AND INDIRECT COSTS (H + I)				5,000	
K RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPM 252 AND 253)					
L AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$ 5,000	
PI/PO TYPED NAME & SIGNATURE		DATE		FOR NSF USE ONLY	
Robert E. Bair		1/4/92		INDIRECT COST RATE VERIFICATION	
INST. REP. TYPED NAME & SIGNATURE		DATE		Date Checked	
				Date of Rate Sheet	
				Initials - OGC	
				Program	

(SEE INSTRUCTIONS ON
REVERSE BEFORE
COMPLETING)

Total Request Year 5

SUMMARY
PROPOSAL BUDGET

APPENDIX IV

ORGANIZATION		FOR NSF USE ONLY		
		PROPOSAL NO.	DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR		AWARD NO.	Proposed	Granted
The Research Foundation of State University of New York				
Robert E. Baier				
A SENIOR PERSONNEL PI/PO Co PI's Faculty and Other Senior Associates (List each separately with title. A & B show number in brackets)		NSF FUNDED PERSON MOS	FUNDS REQUESTED BY PROPOSER	FUNDS GRANTED BY NSF (IF DIFFERENT)
		CAL	ACADEMIC	
1 Administrative Assistant (S. Arnold)		6		\$14,471
2 Co-Director (J. A. Gardella, Jr.)			1	5,100
3 Evaluator (E. Zablocki)		1.5		5,000
4				
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)				
6. (3) TOTAL SENIOR PERSONNEL (1-5)				24,571
B OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				
1 () POST DOCTORAL ASSOCIATES				
2 () OTHER PROFESSIONALS (TECHNICIAN PROGRAMMER ETC)				
3 () GRADUATE STUDENTS				
4 (1) UNDERGRADUATE STUDENTS Women/Minority Fellowship				4,488
5 (1) SECRETARIAL CLERICAL C. Turley 6 mos.				4,050
6 () OTHER				
TOTAL SALARIES AND WAGES (A+B)				33,109
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) 29.5%				8,443
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				41,552
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000)				
TOTAL PERMANENT EQUIPMENT				
E TRAVEL 1 DOMESTIC (INCL CANADA AND U.S. POSSESSIONS)				2,500
2 FOREIGN				
F PARTICIPANT SUPPORT COSTS				
1 STIPENDS \$				
2 TRAVEL				
3 SUBSISTENCE				
4 OTHER				
TOTAL PARTICIPANT COSTS				
G OTHER DIRECT COSTS				
1 MATERIALS AND SUPPLIES postage, xerox, meetings, communications				3,819
2 PUBLICATION COSTS/PAGE CHARGES Prospectus				1,500
3 CONSULTANT SERVICES				
4 COMPUTER (ADPE) SERVICES				
5 SUBCONTRACTS Montana State University				22,442
6 OTHER				
TOTAL OTHER DIRECT COSTS				27,762
H TOTAL DIRECT COSTS (A THROUGH G)				71,814
I. INDIRECT COSTS (SPECIFY)				
TOTAL INDIRECT COSTS 11.4% TDC				8,186
J TOTAL DIRECT AND INDIRECT COSTS (H + I)				80,000
K RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPM 252 AND 253)				
L AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$80,000
PI/PO TYPED NAME & SIGNATURE Robert E. Baier		DATE 12/10/92	FOR NSF USE ONLY	
INST. REP. TYPED NAME & SIGNATURE		DATE	INDIRECT COST RATE VERIFICATION	
		Date Checked	Date of Rate Sheet	Initials - DGC
				Program